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09/587,180	06/02/2000	Bernard A. Traversat	5181-49700	7222

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EXAMINER
HO, THANG H

ART UNIT	PAPER NUMBER
2188	

40

DATE MAILED: 02/09/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

		Application No.	Applicant(s)	
Office Action Summary		09/587,180	TRAVERSAT ET AL.	
		Examiner	Art Unit	
		Thang H Ho	2188	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 November 2003*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-34* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-34* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage
application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☐ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
    Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____.

5)☐ Notice of Informal Patent Application (PTO-152)

6)☐ Other: _____.

DETAILED ACTION

Response to Amendment

1.   This Office Action is in response to applicant's request for reconsideration dated

11/17/2003. The applicant's remarks and request were considered with the results that follow.

2.   Claims 1-34 are pending in this application for examination. No claims have been

amended, added or cancelled. Therefore, claims 1-34 remain pending in the application.

Claim Rejections - 35 USC § 103

3.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in
> section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are
> such that the subject matter as a whole would have been obvious at the time the invention was made to a person
> having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the
> manner in which the invention was made.

4.   Claims 1-9, 1 1-29 and 31-34 are rejected under 35 U.S.C. 103(a) as being unpatentable

over Swanberg et al. (USPN 5,778,443), hereinafter Swanberg in view of Bean et al. (USPN:

4,843,541), hereinafter Bean.

        As per claims 1 and 25, Swanberg teaches in figures 1 and 3 a method for

managing a virtual memory (305) in a computer system (100), the method comprising:

executing a process within the computer system (100), wherein the computer system

(100) comprises a virtual memory manager (335); the virtual memory manager storing

objects for the process executing on the computer system (100) to a store heap (40),

wherein the objects are for use during execution of the process; the process referencing a

first one of the objects stored in the store heap (40); and the virtual memory manager

(305) copying a section of the store; heap (40) including the first object to an in-memory

heap (14) in response to the process referencing the first object, wherein the in-memory

heap (14) comprises copies of sections of the store heap (40) for the process, and wherein

said copying is performed when the first object referenced by the process is in the section

of the store heap (40) and not in the in-memory heap (14) when the first object is

referenced by the process (e.g. column 4, lines 2-6, column 2, lines 39-42 and column 6,

lines 66 et seq.). It is noted that Swanberg refers to the virtual memory manager (335) as

a paging mechanism. However, the paging mechanism is being considered as a virtual

memory manager since it performs the same function as the virtual memory manager of

the current invention (e.g. column 4, lines 2-11).

Swanberg does not teach the method for managing the virtual memory in a virtual

machine.

Bean teaches that the method for managing system resources including system

virtual memory in a virtual machine. Bean teaches that the system resources can be

divided into multiple logical partitions to support multiple virtual machines allowing

multiple applications and operating systems to operate concurrently efficiently within a

single computer system simplifying the development and implementation of operating

systems and their applications (e.g. abstract and column 7, lines 57 et seq.).

Accordingly, it would have been prima facie obvious for one skilled in the art at

the time the invention was made to implement the virtual memory management method

within a computer system as taught by Swanberg and modify the method to include the

management of virtual memory within a virtual machine as taught by Bean to generate

the claimed invention with a reasonable expectation of success for the reasons set forth

above.

As per claims 2-3 and 26, Swanberg discloses the method in claim 1, further

comprising: the process modifying the first object in the in-memory heap (14); and the

virtual machine virtual memory manager (305) replacing the section of the store heap

(40) with the copy of the section from the in-memory heap (14) including the first object

in response to said modifying the first object in the in-memory heap (14); and removing

the copy of the section from the in-memory heap (14) after said replacing the section of

the store heap (40) (e.g. column 4, lines 12-30).

As per claims 4 and 27, Swanberg discloses the method in claim 1, wherein the

virtual machine is executing on a device (100); wherein the device comprises a memory

(14); and wherein the virtual machine is executing in the memory (14) comprised in the

device (100).

As per claim 5, Swanberg discloses the method in claim 4, wherein the device

(100) has insufficient execution memory to store an entire heap (40) for the process

executing on the virtual machine (e.g. see column 1. lines 30-38).

As per claim 6, Swanberg discloses the method in claim 4, wherein the device

(100), comprising a communication adapter (34), is a network client device (e.g. column

3, lines 24-26).

As per claims 7 and 28, Swanberg discloses the method in claim 1, wherein the

process is executing in a first memory space comprised in the virtual machine; wherein

the in-memory heap (14) is comprised in the first memory space; wherein a total size of

the store heap (40) is greater than available memory space in the first memory space; and

wherein the store heap (40) is comprised in a second memory space (e.g. column 1, lines

24-38).

As per claims 8-9 and 29, Swanberg discloses the method in claim 1, wherein the

virtual machine is executing on a device (100); and wherein the store heap (40) is

comprised in a non-volatile memory device (32) coupled to the device.

As per claims 11 and 31, Swanberg discloses the method of claim 8, wherein the

memory device comprising the storage heap is coupled to the device (100) via the

Internet through communication adapter (34) so that the virtual machine virtual memory

manager (305) copying the section of the store heap (40) to the in-memory heap (14)

occurs over the Internet (e.g. column 3, lines 24-26).

As per claims 13 and 33, Swanberg discloses the method in claim 1, wherein the

store heap (40) is one of a plurality of store heaps (320) in a persistent store (32); wherein

each of the plurality of store heaps (320) is associated with one of a plurality of

processes; and wherein the process is one of the plurality of processes (e.g. see figure 6).

As per claims 14 and 34, Swanberg discloses the method of claim 1, wherein the

objects comprised in the in-memory heap (14) and the store heap (40) comprise code and

data for use by the process during execution within the virtual machine.

5.   Claims 10 and 30 are rejected under 35 U. S. C. 103(a) as being unpatentable over

Swanberg et al. (USPN 5,778,443) in view of Bean et al. (USPN: 4,843,541) as applied to claims

1-13, 15-29 and 31-34 above, and further in view of Sukegawa (USPN: 5,860,083).

Swanberg teaches the method in claim 8, wherein the memory device (32) coupled to the

device (100) is a non-volatile memory.

Swanberg does not teach the use of flash memory; wherein the store heap (40) comprises

a plurality of cache lines; and wherein the section of the store heap comprises one or more of the

plurality of cache lines.

Sukegawa teaches that flash memory can be used as a store heap (40) comprising a

plurality of cache lines to improve the overall system performance. Furthermore, it is

advantageous to use flash memory since it has higher access speed and power is not required in

order to retain cache data during power off thereby reducing the startup time for operating

systems and application programs and the overall power consumption, respectively (e.g. figure 1,

column 1, lines 17-61).

Accordingly, it would have been prima facie obvious for one skilled in the art at the time

the invention was made to implement the memory device using non-volatile memory as taught

by Swanberg and utilizing flash memory as taught by Sukegawa to generate the claimed

invention with a reasonable expectation of success for the reasons set forth above.

6.   Claims 12 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over

Swanberg et al. (USPN 5,778,443) as applied to claims 1-13, 15-29 and 31-34 above, and further

in view of Fresko et al. (USPN: 5,966,702;), hereinafter Fresko.

Swanberg teaches the method for managing a virtual memory in a virtual machine as

claimed.

Swanberg does not teach the use of a Java virtual machine (JVM) as the virtual machine

or to use of Java application as a process within the Java virtual machine.

Fresko teaches that a Java application or an applet can be used as a platform-independent process executing on a JVM to accommodate the variety of hardware systems used by clients (e.g. column 1, lines 29-37).

It would have been prima facie obvious for one skilled in the art at the time the invention was made to implement the method for managing a virtual memory in a virtual machine as taught by Swanberg and utilizing JVM and Java application as taught by Sukegawa to generate the claimed invention with a reasonable expectation of success.

One skilled in the art would have been motivated to do so because Java programs can run on any platform that supports Java. It is not necessary to recompile a Java program to run on a new machine.

Claims 15-24 and 25-34 encompass the same scope of invention as to that of claims 1-14 and 25-34, however the claims are drafted as apparatus format rather than method format, the claims are therefore rejected for the same reasons as being set forth above.

Response to Arguments

7.   Applicants' arguments filed 11/17/2003 with respect to Claims 1-34 have been fully considered but they are not persuasive.

Applicants asserted:

> (a) The combination of Swanberg and Bean clearly does not teach or suggest Applicants' claimed invention since Bean teaches the virtual machines of completely different type.

(b) Prior art does not include a virtual memory manager, store heap and

in-memory heap for processes running on the virtual machine, but only

"provides lower level functionality like virtual memory management".

(c) Examiner fails to provide a motivation to combine the teachings of the

Swanberg and Bean references.

(d) Examiner fails to address claims 20 and 22.

(e) Examiner did not reject claims 10 and 12. However, the rejections of

claims 10, 12, 30 and 32 are clearly improper.

(f) The flash memory cache described in Sukegawa is cache for a hard

disk drive (HDD) and has nothing to do with cache lines for a virtual

memory.

Examiner respectfully traverses Applicants' remarks for the following reasons:

With respect to (a), Applicants in regard to the term "virtual machine" is

not commensurate in scope with the claims. The claim language does not specify

a specific type of virtual machine as being argued by Applicants.

With respect to (b), firstly, it has been admitted by Applicants that the

prior art discloses functionality like virtual memory management. Secondly,

Swanberg clearly discloses a virtual memory manager, store heap and in-memory

heap for processes running on a computer system instead of running on a virtual

machine. However, the combination of Swanberg and Bean detailed in claims 1

and 25 of the previous Office Action mailed on August 13, 2003 discloses a

virtual memory manager, store heap and in-memory heap for processes running on a virtual machine.

With respect to (c), the motivation to combine of "allowing multiple applications and operating systems to operate concurrently efficiently within a single computer system simplifying the development and implementation of operating systems and their applications" was clearly stated on page 3 of the previous Office Action.

With respect to (d), claims 20 and 22 encompass the same scope as 10 and 12, respectively. The claims were rejected for the same reasons set forth in claims 10 and 12 as indicated on page 7, item 7 of the previous Office Action.

With respect to (e), Applicants stated that Examiner did not reject claims 10 and 12, but also asserted that the rejections of claims 10 and 12 were clearly improper. Claims 10 and 12 were rejected on pages 5-7, items 5-6 of the previous Office Action under 35 U.S.C. 103 (a) as being unpatentable over Swanberg as applied to claims 1-13, 15-29 and 31-34, and further in view of Sukegawa instead of being unpatentable over Swanberg and Bean as applied to claims 1-13, 15-29 and 31-34, and further in view of Sukegawa. Examiner sincerely apologizes for the typographically errors and any inconvenience that it may cause.

With respect to (f), Sukegawa teaches the use of flash memory as cache memory to improve the overall system performance. The point is that one of ordinary skilled in the art would recognize and appreciate that it is advantageous to use flash memory instead of conventional DRAM since flash memory has

higher access speed and power is not required in order to retain cache data during power off thereby reducing the startup time for operating systems and application programs and the overall power consumption, respectively.

Therefore, the rejection of claims 1-34 is deemed to be proper. The combination of Swanberg, Bean, Sukegawa and Fresko discloses each and every element recited within claims 1-34.

Conclusion

2.   **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

3.   Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thang H Ho whose telephone number is 703-305-1888. The examiner can normally be reached on Monday-Friday from 7:00 A.M. - 4:30 P.M..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Mano Padmanabhan can be reached on 703-306-2903. The fax phone number for the

organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding

should be directed to the receptionist whose telephone number is 703-305-9600.

Thang Ho
Art Unit 2188
February 6, 2004